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#9-15, 29, 47

9.  $x^2 + 6x > -10$   $x = \frac{-6 \pm \sqrt{36 - 4(1)(10)}}{2(1)} = \frac{-6 \pm \sqrt{-4}}{2}$

$$x^2 + 6x + 10 > 0$$

$\{x \mid x \in \mathbb{R}\}$  (all <sup>real</sup> x-values satisfy the inequality)

10.  $2x^2 \leq -x - 4$   $x = \frac{-1 \pm \sqrt{1 - 4(2)(4)}}{2(2)} = \frac{-1 \pm \sqrt{-31}}{4}$

$$2x^2 + x + 4 \leq 0$$

no solution

11.  $4x^2 + 8 \leq 5 - 2x$   $x = \frac{-2 \pm \sqrt{4 - 4(4)(3)}}{2(4)} = \frac{-2 \pm \sqrt{-44}}{8}$

$$4x^2 + 2x + 3 \leq 0$$

no solution

12.  $2x^2 + 8x \geq 4x - 8$   $x = \frac{-1 \pm \sqrt{1 - 4(1)(4)}}{2(1)} = \frac{-1 \pm \sqrt{-15}}{2}$

$$2x^2 + 4x + 8 \geq 0$$

$$x^2 + x + 4 \geq 0$$

$\mathbb{R}$

13.  $2b^2 + 16 \leq b^2 + 8b$

$$b^2 - 8b + 16 \leq 0$$

$$(b-4)(b-4) \leq 0$$

$$\begin{array}{c} + \quad 0 \quad + \\ \hline \leftarrow \quad \quad \quad \rightarrow \\ \quad \quad \quad 4 \end{array}$$

$\{4\}$  ← only x that makes it = 0.

$$14. \begin{aligned} c^2 + 12 &\leq 3 - 6c \\ c^2 + 6c + 9 &\leq 0 \\ (c+3)(c+3) &\leq 0 \end{aligned}$$

$\leftarrow \begin{array}{ccc} + & 0 & + \\ & | & \\ & -3 & \end{array} \rightarrow$

$$\{-3\}$$

$$15. \begin{aligned} -a^2 &\geq 4a + 4 \\ 0 &\geq a^2 + 4a + 4 \\ 0 &\geq (a+2)(a+2) \end{aligned}$$

$\leftarrow \begin{array}{ccc} + & 0 & + \\ & | & \\ & -2 & \end{array} \rightarrow$

$$\{-2\}$$

$$29. \frac{750 + 25x}{x} < 120$$

$$750 + 25x < 120x$$

$$750 - 95x < 0$$

$$750 < 95x$$

$$7.89 \text{ people} < x$$

$$[8, 14]$$

(14 person max from problem)

numerator = total cost  
denominator = # of people = cost per person

$$47. 3a^4 + 7a^3 - 56a^2 - 80a < 0$$

$$a(3a^3 + 7a^2 - 56a - 80) < 0$$

$$a(a-4)(a+5)(3a+4) < 0$$

$\leftarrow \begin{array}{ccccccc} + & - & + & - & + \\ & | & | & | & | \\ & -5 & -\frac{4}{3} & 0 & 4 \end{array} \rightarrow$

$$\left(-5, -\frac{4}{3}\right) \cup (0, 4)$$